

REMARKS

The Examiner has rejected claims 2, 4, 5, and 22 under 35 § U.S.C. 103(a) as being unpatentable over Tauchi (US Patent No. 5,966,939) in view of Hayes et al. (US Patent No. 6,077,380). The Examiner has also rejected claim 4 under 35 § U.S.C. 103(a) as being unpatentable over Tauchi and Hayes in view of Kuramoto (US Pub. 2001/0020744).

Pending claim 2 is directed to a microelectromechanical component with at least one soldering layer for joining to at least one further component. The solder comprises a eutectic mixture of gold and bismuth and a bismuth layer for producing a soldered joint with a gold layer.

Tauchi teaches a multilevel thermoelectric cooling device composed of at least two cooling units. A first cooling unit comprises a thermoelectric element bonded by a first solder to the corresponding electrodes. The second cooling unit is mounted on the first cooling unit and comprises a thermoelectric element as well bonded by a solder to the electrodes.

However, a component with a soldering layer comprising a eutectic Bi/Au mixture and a bismuth layer according to claim 2 is neither disclosed nor obvious in view of Tauchi.

Hayes describes solid spheres coated with a low melting material and a method of forming those spheres. The spheres are used for instance as a solder for joining arrays. The coated spheres are formed by merging droplets of two different materials whereas the lower melting material is deposited as a coating on a droplet of the higher melting material. Preferred materials are copper as the high melting

material and a solder, e.g. bismuth or gold, as the low melting material. This process leads to the formation of spheres coated with a solder.

The spheres might be used for joining substrates, for instance in microelectronic devices (figure 6 of Hayes). The temperature during the soldering process is such that only the outer layer of the solder is molten and not the core made of the higher melting material.

Although Hayes teaches a component having a soldering layer comprising a eutectic mixture of Gold (Au) and Bismuth (Bi), it does not disclose a component which has beside this layer a further bismuth layer for producing another soldered joint to a gold layer. The specific composition of the component according to claim 2 enables the production of multilayered structures.

Therefore, a component with a soldering layer comprising a eutectic Bi/Au mixture and a bismuth layer according to claim 2 is also not disclosed or obvious by the teaching of Hayes.

Also a combination of the teachings of Hayes and Tauchi would not lead a person skilled in the art to the component according to claim 2 since none of the cited documents indicates a component comprising a soldering Au/Bi-layer as well as bismuth layer.

With further regard to dependent claim 4, Kuramoto relates to a method of forming a solder film on a metallic surface. This is achieved by depositing tacky substrates as benzotriazole or imidazol derivatives on the metallic surface followed by applying the solder. The solder then is molten under formation of thin solder film. Examples for solders are eutectic bismuth alloys [0063 - 0065]. The used solder particles

have sizes of 1 to 500 μm (0062). The formed solder film possesses a thickness between 5 to 200 μm (claims 1 and 4 of Kuramoto).

However, Kuramoto also does not indicate a component with a Au/Bi-soldering layer and a further bismuth layer for producing a further soldered joint.

The component according to claim 2 is also not disclosed or obvious in light of Kuramoto.

Therefore, pending claim 4 is also not disclosed or obvious in view of the cited prior art.

Amended claim 5 is directed to a microelectromechanical device comprising at least two components joined by a eutectic Au/Bi solder, whereby at least one component is made of two substrates also joined by said Au/Bi solder and each substrate has a thermoelectric material facing the other substrate arranged thereon.

Tauchi teaches a component made of at least two substrates joined by a solder, whereby each substrate has a thermoelectric material arranged thereon. The thermoelectric material according to Tauchi is arranged on a substrate in such a manner that the thermoelectric material is not facing each other. The thermoelectric material according to Tauchi is rather arranged as singular layer on each substrate and then is bonded to a further substrate but not on the side, where the thermoelectric material is arranged on rather on the opposite site. Therefore, the thermoelectric materials are not facing each other.

Hayes teaches the use of a eutectic Au/Bi mixture as a solder, but does not indicate a device according to amended claim 5.


Also, combining the teaching of Hayes and Tauchi would not lead the person skilled in the art to the device according to amended claim 5 since Tauchi simply does not disclose such a device with the specific feature that the thermoelectric material arranged on the substrate is facing each other.

The device according to amended claim 5 is novel and not obvious in view of Tauchi. Therefore, also the depending claims 6 and 22 are novel and not obvious in view of the cited prior art.

In view of the above, Applicant believes the pending application is in condition for allowance.

Dated: June 23, 2006

Respectfully submitted,

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